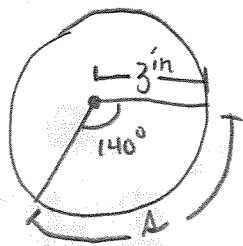Section 7.1

#22) We are given

and asked to find arc length.

Soln: We know
$$A = r\theta,$$
but only if θ is measured in radians. So convert

$$140° = (140°)\left(\frac{2\pi \text{ rad}}{360°}\right) = \frac{(2\pi)(140)}{360 \,\, 180} \text{ rad}$$

$$= \frac{140\pi}{180} \text{ rad}$$

$$= \frac{70\pi}{90} \text{ rad} = \frac{35\pi}{45} \text{ rad} = \frac{7\pi}{9} \text{ rad}$$

Now we use $r = 3$, $\theta = \frac{7\pi}{9}$ in $A = r\theta$ to obtain

$$A = 3\left(\frac{7\pi}{9}\right) = \frac{7\pi}{3} \text{ in}$$

#28) $-\frac{5\pi}{4} \text{ rad} = \left(-\frac{5\pi}{4} \text{ rad}\right)\left(\frac{360°}{2\pi \text{ rad}}\right) = \left(-\frac{5\pi(360)}{8\pi}\right)°$

$$= \left(\frac{-5\pi(45)}{}\right)°$$

$$= (-225)°$$

#39) $150° = (150°)\left(\frac{2\pi \text{ rad}}{360°}\right) = \frac{300\pi}{360} \text{ rad} = \frac{30\pi}{36} \text{ rad} = \frac{10\pi}{12} \text{ rad} = \frac{5\pi}{6} \text{ rad}$

#41) We are given $r = 5.02$ and $\theta = \frac{\pi}{3} \text{ rad}$. Therefore using $A = r\theta$, we see

$$A = 5.02\left(\frac{\pi}{3}\right) \approx 5.256$$

Problem A:

We are told $\theta = 72°$ (a problem! needs to be radians) and $s = 2$. First convert θ to radians:

$$\theta = 72° = (72°)\left(\frac{2\pi \text{ rad}}{360°}\right) = \frac{144\pi}{360} \text{ rad}$$

$$= \frac{72\pi}{180} \text{ rad}$$

$$= \frac{36\pi}{90} \text{ rad}$$

$$= \frac{18\pi}{45} \text{ rad}$$

$$= \frac{2\pi}{5} \text{ rad}$$

Now using $s = r\theta$, we plug in $\theta = \frac{2\pi}{5}$ and $s = 2$ to get

$$2 = r\left(\frac{2\pi}{5}\right)$$

and solving for r, we get

$$\boxed{r = \frac{10}{2\pi} = \frac{5}{\pi}}$$

$$\begin{array}{r} 72 \\ \times\ 2 \\ \hline 144 \end{array}$$